

PLATINUM METALS REVIEW

*A quarterly survey of research on the platinum metals and of
developments in their applications in industry*

VOL. I

JANUARY 1957

NO. 1

Contents

Editorial	2
Platinum Mining in the Transvaal	3
The Protection of Chemical Process Equipment	9
Electrodeposited Rhodium in Co-axial Radio-Frequency Circuits	14
Electrodeposition of Ruthenium	19
A Thermocouple for High Temperatures	20
Creep Properties of Platinum Metals and Alloys	23
The Platinum Metals in Catalysis	24
Cathodic Protection of Naval Vessels	26
Abstracts	27
New Patents	32

*Communications should be addressed to
The Editor, Platinum Metals Review
Johnson, Matthey & Co., Limited, Hatton Garden, London, E.C.1*

THE usefulness to industry of any one of the many metals and alloys from which a choice may nowadays be made depends naturally enough upon its providing some essential combination of properties that cannot be found elsewhere at comparable cost. The inherent characteristics of platinum—high melting point and exceptional resistance to corrosion combined with excellent working properties—opened up fields for its application from the very beginnings of modern industry and gave it, in fact, a unique place in the history of research and invention.

The published researches of Faraday and of those who followed him in developing our knowledge of electrical phenomena show how greatly they relied upon platinum to provide a means of carrying, making and breaking current. Reliable platinum crucibles played a fundamental part in obtaining analytical data for the infant science of chemistry; platinum boilers permitted the concentration of sulphuric acid in the pioneer days of chemical industry. The development of the electric telegraph, of the incandescent lamp, and later of the thermionic valve, all involved the use of platinum, as did the early internal combustion engines, first for igniter tubes and subsequently for magneto contacts.

Through the development of modern metallurgical knowledge some of these early demands have been met by other materials, but further and broader applications have become established. Today substantial quantities of platinum are employed, for example, as contacts in telephone relays, as electrodes in industrial electrochemical processes, as thermocouples for measuring the temperature of molten steel, and as catalysts in the production of nitric acid and of high octane petroleum spirit. Its resistance to attack and its strength at high temperatures make platinum the only suitable material for certain types of equipment handling molten glass, while platinum-wound electric furnaces are used in metallurgy, in the glass and ceramic industries and in nuclear research.

The association of Johnson Matthey with platinum has been long and intimate. It was in January, 1817, just 140 years ago, that Percival Norton Johnson established himself in business, but five years earlier, at the age of nineteen, he had contributed a paper on platinum to the *Philosophical Magazine*. By the 1830's the firm had become recognised as refiners of platinum and makers of platinum apparatus, and its steady growth in this field has continued.

A major development in the world's platinum industry began to take shape in the nineteen-twenties, when large deposits of the platinum metals were discovered in the Transvaal in South Africa. Although the problems of extraction presented great difficulties, these were eventually overcome, and in 1931 Rustenburg Platinum Mines Ltd. was formed to work these deposits, with Johnson Matthey as refiners and distributors of the metals produced. To meet the steadily increasing demand steps have been taken from time to time to expand production from these mines, and Rustenburg is now established as the world's largest individual producer of platinum.

Interest in platinum's five sister metals—palladium, rhodium, iridium, osmium and ruthenium—was later in development than with platinum itself, but over the past thirty years or so they too have found growing applications in chemical and electrical engineering.

It is to provide engineers, chemists, metallurgists and other users with a source of current information on the properties and industrial applications of platinum and its associated metals that the publication of *Platinum Metals Review* has been undertaken.